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10/535,477	04/04/2006	Keisuke Itakura	1453.706	7171

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CHAN LAW GROUP LLP
1055 W. 7TH ST,
SUITE 1880
LOS ANGELES, CA 90017

EXAMINER	
SALVITTI, MICHAEL A	
ART UNIT	PAPER NUMBER
1796	

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/535,477	ITAKURA ET AL.	
	Examiner	Art Unit	
	MICHAEL A. SALVITTI	1796	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *31 August 2009*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-11 and 14-20* is/are pending in the application.

4a) Of the above claim(s) *15-20* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-9* is/are rejected.

7)☐ Claim(s) *10,11 and 14* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☒ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Specification

The title is objected to because of the following informalities: "Deelectric" is a typo of "dielectric".

Appropriate correction is required.

Claim Objections

Claims 10, 11 and 14 are objected to under 37 CFR 1.75(c) as being in improper form because a multiple dependent claim cannot depend from any other multiple dependent claim. See MPEP § 608.01(n). Accordingly, the claims have not been further treated on the merits.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 1, 3-4, 6 and 9 are rejected under 35 U.S.C. 103(a) as being unpatentable over US 2002/0132898 to *Takaya et al* (hereinafter referred to as *Takaya '898)* in view of EP1262450 to *Takaya et al*. (hereinafter *Takaya '450)*. Supporting evidence is provided by U.S. Patent No. 4,803,591 to *Miyashita et al.*

Claims 1, 3-4, 9 12 and 14 are rejected under 35 U.S.C. 103(a) as being unpatentable over US 2002/0132898 to *Takaya et al* (hereinafter referred to as *Takaya '898)* in view of EP1262450 to *Takaya et al*. (hereinafter *Takaya '450*)

Regarding claims 1, 3-4, 6 and 9: *Takaya '898* teaches a resin material (polyvinyl benzyl ether) composite dielectric material comprising ceramic powder (¶ [0038]). The ceramic powder may be approximately spherical (spherical, elliptical; ¶ [0279]) and is based on the formula $BaO\text{-}R_2O_3\text{-}TiO_2$ (¶ [0043]). "R" is a rare earth oxide (Nd in Sample 301, Table 6; ¶ [0390]). The material further comprises an oxide of a transition metal element having at least two states of ionic valences less than 4 (manganese oxide: ¶ [0255]). *Takaya '898* shows an embodiment wherein the content of dielectric ceramic powder is 50% based on volume of the resin material (see Table 6, Samples 301).

Takaya '898 is silent regarding the sphericity of the dielectric ceramic powder of 0.85 to 1. *Takaya '450* teaches dielectric ceramic powders with sphericity of 0.9 to 1 (¶ [0062]). *Takaya '898* and *Takaya '450* are analogous art, in that they are drawn to the same field of endeavor, namely creating polymeric resins comprising ceramic filler of barium/rare earth elements/titanium and manganese. At the time of the invention, it would have been obvious to a person having ordinary skill in the art to ensure that the ceramic powders of *Takaya '898* have a sphericity of 0.85 to 1, with the motivation of establishing uniformity in resins, which avoids cracking upon firing (*Takaya '450* ¶ [0062]).

Takaya '898 is silent in reporting the measurement of whether the composite dielectric material has an electric resistivity of 10^{12} ohm-cm or more. However, the electric resistivity of 10^{12} ohm-cm or more is held to be inherent for the following reason: *Takaya '898* teaches (Sample 301, Table 6; ¶ [0390]) an embodiment wherein BaO-TiO_2-Nd_2O_3 is added at 50 vol% to a polyvinylbenzyl ether resin. As noted above, addition of manganese oxides is taught (¶ [0255]), as a means to improve temperature properties (¶ [0263]). The Sample 301 embodiment is substantially identical to Example 1 in the instant application (wherein BaO-TiO_2-Nd_2O_3 is added at 50 vol% to a polyvinylbenzyl ether resin), reporting an electrical resistivity of 5.5 X 10^{13} ohms x meter. Upon the addition of manganese oxide, the Office holds the composition of *Takaya '898* to inherently possess an electrical resistivity above 10^{12} ohm-cm.

Takaya '898 is silent regarding the specific surface area of the ceramic powder. The Examiner is of the opinion that the powder has a specific surface area of 1.2 m^2/g or less for the following reason:

Miyashita teaches the following relationship between particle diameter and BET surface area (col. 3, lines 1-11):

$$S_A = \frac{6}{D_A}$$

where the numeral 6 is a shape factor assuming all the particles being spherical, S_A is a specific surface area (m^2/g) measured by BET method developed by Brunauer, Emmett, and Teller[1] and is measured in the present invention, is a true density of barium titanate (g/cm^3), and D_A is a specific surface area diameter (μm).

[1] S. Brunauer et al; J. Am. Chem. Soc. 60 309 (1938)

Thus, a particle with a diameter of 5 μm or greater possesses a BET surface area of 1.2 or less (6/5=1.2 m^2/g). *Takaya '898* teaches the particles of Sample 301 to have a particle size of 5 μm (¶ [0388]), which is calculated to be 1.2 m^2/g. While *Takaya '898* does not relate with absolute certainty the particle size to the diameter, *Takaya '898* does teach overlapping ranges of particle sizes from 0.2 to 100 μm (¶ [0256]), wherein the BET is 1.2 m^2/g or less. *Takaya '898* recognizes particle size as a result effective variable (¶ [0256]); in the case where the claimed ranges overlap or lie inside ranges disclosed by the prior art a *prima facie* case of obviousness exists. *In re Wertheim*, 541 F.2d 257, 191USPQ 90 (CCPA 1976). See MPEP § 2144.05. At the time of the invention, it would have been obvious to a person having ordinary skill in the art to optimize the particle size such that the surface area is between 0 and 1.2 m^2/g, with the motivation of avoiding the non-uniform dispersion that may occur with mixing (too large of a particle size) and an increase in viscosity which obstructs high loading of ceramic particles (too small of a particle size). See ¶ [0256].

Claims 2-4, 6 and 9 arerejected under 35 U.S.C. 103(a) as being unpatentable over US 2002/0132898 to *Takaya et al* (hereinafter referred to as *Takaya '898)* in view of EP1262450 to *Takaya et al*. (hereinafter *Takaya '450*). Supporting evidence is provided by U.S. Patent No. 4,803,591 to *Miyashita et al.*

Regarding claim 2-4, 6 and 9: *Takaya '898* teaches a resin material (polyvinyl benzyl ether) composite dielectric material comprising ceramic powder (¶ [0038]). The ceramic powder may be approximately spherical (spherical, elliptical; ¶ [0279]) and is

based on the formula $BaO\text{-}R_2O_3\text{-}TiO_2$ (¶ [0043]). "R" is a rare earth oxide (Nd in Sample 301, Table 10; ¶ [0447]). The material further comprises an oxide of a transition metal element having at least two states of ionic valences less than 4 (manganese oxide: ¶ [0255]). *Takaya '898* shows an embodiment wherein the content of dielectric ceramic powder is 50% based on volume of the resin material (see Table 6, Samples 301).

Takaya '898 is silent in explicitly stating that the dielectric ceramics must be spherical, with a sphericity of 0.85-1. *Takaya '450* teaches spherical ceramics as applied to polymer resins (¶ [0018]); these spherical ceramics have a sphericity of 0.9-1 (*Takaya '450* ¶ [0062]. *Takaya '898* and *Takaya '450* are analogous art, in that they are drawn to the same field of endeavor, namely creating polymeric resins comprising ceramic filler of barium/rare earth elements/titanium and manganese. At the time of the invention, it would have been obvious to a person having ordinary skill in the art to use spherical particles with the resin taught by *Takaya '898*, with the motivation of facilitating the uniformity of the dispersion, which reduces cracking due to non-uniformity (*Takaya '450* ¶ [0062]).

Takaya '898 is silent in reporting the measurement of whether the composite dielectric material has an electric resistivity of 10^{12} ohm-cm or more. However, the electric resistivity of 10^{12} ohm-cm or more is held to be inherent for the following reason: *Takaya '898* teaches (Sample 301, Table 10; ¶ [0447]) an embodiment wherein $BaO\text{-}TiO_2\text{-}Nd_2O_3$ is added at 50 vol% to a polyvinylbenzyl ether resin. As noted above, addition of manganese oxides is taught (¶ [0255]). The Sample 301 embodiment is

substantially identical to Comparative Example 4 in the instant application (wherein $BaO\text{-}TiO_2\text{-}Nd_2O_3$ is added at 50 vol% to a polyvinylbenzyl ether resin with 0.15% $MnCO_3$), reporting an electrical resistivity of 5.5 X 10^{13} ohms per meter. At the time of the invention, it would have been obvious to a person having ordinary skill in the art to add MnO to the *Takaya '898* Sample 301, with the motivation of improving the Q, sinterability and temperature properties (*Takaya '898* ¶ [0263]). Upon the addition of 0.15%, the Office holds the composition of *Takaya '898* to inherently possess an electrical resistivity above 10^{12} ohm-cm.

Takaya '898 is silent regarding the specific surface area of the ceramic powder. The Examiner is of the opinion that the powder has a specific surface area of 1.2 m^2/g or less for the following reason:

Miyashita teaches the following relationship between particle diameter and BET surface area (col. 3, lines 1-11):

$$S_A = \frac{6}{D_A}$$

where the numeral 6 is a shape factor assuming all the particles being spherical, S_A is a specific surface area (m^2/g) measured by BET method developed by Brunauer, Emmett, and Teller[1] and is measured in the present invention, is a true density of barium titanate (g/cm^3), and D_A is a specific surface area diameter (μm).

[1] S. Brunauer et al., J. Am. Chem. Soc. 60 309 (1938)

Thus, any particle with a diameter of 5 μm or greater possesses a BET surface area of 1.2 or less (6/5=1.2). *Takaya '898* teaches the particles of Sample 301 to have a particle size of 5 μm (¶ [0388]). While *Takaya '898* does not relate with absolute

certainty the particle size to the diameter, *Takaya '898* does teach overlapping ranges of particle sizes from 0.2 to 100 μm (¶ [0256]), wherein the BET is 1.2 m^2/g or less. *Takaya '898* recognizes particle size as a result effective variable; in the case where the claimed ranges overlap or lie inside ranges disclosed by the prior art a *prima facie* case of obviousness exists. *In re Wertheim*, 541 F.2d 257, 191USPQ 90 (CCPA 1976). See MPEP § 2144.05. At the time of the invention, it would have been obvious to a person having ordinary skill in the art to optimize the particle size such that the surface area is between 0 and 1.2 m^2/g, with the motivation of avoiding the non-uniform dispersion that may occur with mixing (too large of a particle size) and an increase in viscosity which obstructs high loading of ceramic particles (too small of a particle size). See ¶ [0256].

Claims 5 and 7-8 are rejected under 35 U.S.C. 103(a) as being unpatentable over US 2002/0132898 to *Takaya et al* (hereinafter referred to as *Takaya '898)* in view of EP1262450 to *Takaya et al*. (hereinafter *Takaya '450)* with supporting evidence is provided by U.S. Patent No. 4,803,591 to *Miyashita et al*, as applied to claim 1 above, and further in view of U.S. Patent No. 5,650,368 to *Tateishi et al.*

Regarding claim 5: *Takaya '898* in view of *Takaya '450* teaches the composite dielectric material containing ceramic power of claim 1, as set forth above.

Takaya '898 is silent regarding the dielectric ceramic powder having a composition of BaO 6.67-21.67 mol%, R_2O_3 6.67-26.67 mol% and TiO_2 61.66-76.66 mol%. *Tateishi* teaches a dielectric ceramic composition wherein Ba is 16.75-23.75 mol%, rare earth elements such as Nd are 16.75-23.75 mol%, and a group IV element

such as titanium is 67-71.66 mol% (see *Tateishi* col. 2, lines 25-42). *Takaya '898* and *Tateishi* are analogous art in that they are drawn to the same field of endeavor, namely BaO-R_2O_3-TiO_2 ceramics utilized as dielectric ceramic materials. At the time of the invention, it would have been obvious to a person having ordinary skill in the art to substitute the ceramic taught by *Tateishi* into the invention of *Takaya '898*, with the motivation of obtaining a dielectric material of high dielectric constant (*Tateishi* col. 1, lines 55-64).

Regarding claims 7-8: *Takaya '898* in view of *Takaya '450* teaches the composite dielectric material of claim 1, as set forth above. Manganese oxide is stated to be an additive (¶ [0263]).

Takaya '898 is silent regarding an embodiment wherein the MnO is 0.01 to 0.1 wt% of the composite dielectric material. *Takaya '450* teaches 0.1 mol% manganese oxide (¶ [0081]). The examiner calculates this to be 0.05% based on weight (MnO_2 is 8.7 parts of the composition, the entire composition comprising 16,935 parts by total weight; this was calculated by multiplication of molar ratios times molecular mass, in units of g/mol for each component).

Tateishi teaches the addition of 0.01-0.05% by weight (col. 4, lines 29-39). At the time of the invention, it would have been obvious to a person having ordinary skill in the art to add 0.01 to 0.1 wt% of MnO to the composition of *Takaya '898*, with the motivation of favorably increasing the Q-value (*Tateishi* col. 4, lines 29-39).

Claims 5 and 7-8 are rejected under 35 U.S.C. 103(a) as being unpatentable over US 2002/0132898 to *Takaya et al* (hereinafter referred to as *Takaya '898)* in view of EP1262450 to *Takaya et al*. (hereinafter *Takaya '450)* with supporting evidence is provided by U.S. Patent No. 4,803,591 to *Miyashita et al*, as applied to claim 2 above, and further in view of U.S. Patent No. 5,650,368 to *Tateishi et al.*

Regarding claim 5: *Takaya '898* in view of *Takaya '450* teaches the composite dielectric material containing ceramic power of claim 2, as set forth above.

Takaya '898 is silent regarding the dielectric ceramic powder having a composition of BaO 6.67-21.67 mol%, R_2O_3 6.67-26.67 mol% and TiO_2 61.66-76.66 mol%. *Tateishi* teaches a dielectric ceramic composition wherein Ba is 16.75-23.75 mol%, rare earth elements such as Nd are 16.75-23.75 mol%, and a group IV element such as titanium is 67-71.66 mol% (see *Tateishi* col. 2, lines 25-42). *Takaya '898* and *Tateishi* are analogous art in that they are drawn to the same field of endeavor, namely $BaO\text{-}R_2O_3\text{-}TiO_2$ ceramics utilized as dielectric ceramic materials. At the time of the invention, it would have been obvious to a person having ordinary skill in the art to substitute the ceramic taught by *Tateishi* into the invention of *Takaya '898*, with the motivation of obtaining a dielectric material of high dielectric constant (*Tateishi* col. 1, lines 55-64).

Regarding claims 7-8: *Takaya '898* in view of *Takaya '450* teaches the composite dielectric material of claim 2, as set forth above. Manganese oxide is stated to be an additive (¶ [0263]).

Takaya '898 is silent regarding an embodiment wherein the MnO is 0.01 to 0.1 wt% of the composite dielectric material. *Takaya '450* teaches 0.1 mol% manganese oxide (¶ [0081]). The examiner calculates this to be 0.05% based on weight (MnO_2 is 8.7 parts of the composition, the entire composition comprising 16,935 parts by total weight; this was calculated by multiplication of molar ratios times molecular mass, in units of g/mol for each component).

Tateishi teaches the addition of 0.01-0.05% by weight (col. 4, lines 29-39). At the time of the invention, it would have been obvious to a person having ordinary skill in the art to add 0.01 to 0.1 wt% of MnO to the composition of *Takaya '898*, with the motivation of favorably increasing the Q-value (*Tateishi* col. 4, lines 29-39).

Response to Arguments

The following responses are directed to the document entitled "Remarks/Arguments" (pages 8-15) received August 31st, 2009.

A) The title of the instant application contains a typo ("Deelectric"). This typo was identified in the previous Action of June 26th, 2009, but addressed neither by amendment nor in the current Remarks. As such the objection to the title remains.

B) Amendment to claims 1, 2, 6, 7 and 11 has resolved issues of indefiniteness for the former parenthetical expressions. The previous rejection of claims 1-14 under 35 U.S.C. 112 second paragraph has been withdrawn.

C) Applicant's arguments with respect to claim 1-4 (pages 8-11 of "Remarks") with respect to rejections under 35 U.S.C. § 102(b) to *Takaya* (EP1262450) have been considered but are moot in view of the new ground(s) of rejection.

D) Applicant's arguments with respect to rejection of claims 1, 3, 12 and 14 under 35 U.S.C. 103(a) to *Takaya '898* (US 2002/0132898) in view of *Takaya* (EP1262450) have been fully considered but they are not persuasive.

1) Applicant argues (page 12) that *Takaya '898* fails to disclose or suggest:

> **a)** a composite material comprising a resin material and a dielectric ceramic powder where the composite dielectric material is 1.0 x 10^{12} ohm x cm or more.
>
> **b)** an oxide of a transition metal element having at least two ionic states of ionic valences les than 4.
>
> **c)** an approximately spherical powder.

In response to **a)** and **b)**, Sample 301 of *Takaya '898* has held to be inherent in view of Example 1 of the instant specification (citing an electrical resistivity of 5.5 X 10^{13} ohms per meter). See the rejection above. *Takaya '898* recognizes that the addition of a manganese oxide increases desirable properties such as Q, sinterability and temperature properties (*Takaya '898* ¶ [0263]). *Tateishi* further teaches that manganese oxide (prepared from calcining of $MnCO_3$ in the range of 0.01-0.05 wt%; col. 4, lines 29-33) impart desirable Q-values. A person having ordinary skill in the art

would consider adding metal oxides with two ionic states less than 4 to increase the Q-value (*Tateishi* col. 4, line 39).

In response to **c)**, *Takaya '898* recognizes that spherical particles may be used (¶ [0279]). *Takaya '450* states advantages of spherical particles, such as less tendency to crack (*Takaya '450* ¶ [0062]). This does not teach away from its properties as a dielectric material, as alleged on page 10 of the "Remarks"; the materials retain their dielectric properties regardless of their shape (¶ [0017]-[0019]). A person having ordinary skill in the art, knowing that spherical particles have less tendency to crack would consider utilizing more spherical particles, with the expectation of forming a more durable resin material.

E) Applicant's arguments with respect to rejection of claim 5 under 35 U.S.C. 103(a) to *Takaya '898* (US 2002/0132898) in view of *Takaya* (EP1262450) have been fully considered but they are not persuasive.

In response to applicant's argument that the references fail to show certain features of applicant's invention, it is noted that the features upon which applicant relies (i.e., dielectric constants, Q-value, temperature coefficient, capacitance) are not recited in the rejected claim(s). Although the claims are interpreted in light of the specification, limitations from the specification are not read into the claims. See *In re Van Geuns*, 988 F.2d 1181, 26 USPQ2d 1057 (Fed. Cir. 1993).

F) Claims 10-11 and 14 have not been examined in the instant Action. Amendment to claim 6 (requiring dependency on claims 1 or 2) has incurred multiple dependencies in the above claims. See MPEP § 608.01(n).

Conclusion

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Correspondence

Any inquiry concerning this communication or earlier communications from the examiner should be directed to MICHAEL A. SALVITTI whose telephone number is (571)270-7341. The examiner can normally be reached on Monday-Thursday 8AM-7PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Mark Eashoo can be reached on (571) 272-1197. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Mark Eashoo/
Supervisory Patent Examiner, Art Unit 1796

/M. A. S./
Examiner, Art Unit 1796